

SUBSTITUTE SPECIFICATION (MARKED-UP VERSION)

of

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on

INDUCTION MOTOR HAVING THE ROTOR LOCATED WITHIN A SHELL

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TITLE OF INVENTION: ~~The Mike 8001 induction motor design~~ INDUCTION MOTOR
HAVING THE ROTOR LOCATED WITHIN A SHELL

CROSS-REFERENCE TO RELATED APPLICATIONS:

~~not applicable~~

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT:

~~not applicable~~

REFERENCE TO SEQUENCE LISTING, A TABLE, OR COMPUTER PROGRAM LISTING
COMPACT DISK APPENDIX:

~~not applicable~~

BACKGROUND OF THE INVENTION:

The "induction motor" ~~mentioned in this application is the most commonly used kind is~~
a common type of induction motor, it which gets no electrical winding in its rotor assembly, and
only its stator gets electrical winding.

Textbook definition of "nonmagnetic material": materials whose permeabilities are the
same as that for free space. ~~(Like~~ Examples of nonmagnetic materials include copper, and
aluminum)

Textbook definition of "diamagnetic material": materials that have permeabilities
slightly less than that of free space.

There are three categories of systems used in refrigeration & a/c (air condition) system:
the first is hermetic system in FIG. 1 (shown with a reciprocating compressor), the second is
semi hermetic (also FIG. 1), the third is open type system in FIG. 2 (shown with a reciprocating
compressor).

The open type system usually handles bigger capacity than the former two systems. In the open type system, the motor is not sealed with compressor in a dome and the leak from the compressor crankshaft seal is a constant problem (FIG. 2).

In a hermetic system (including a semi hermetic system), the whole motor and compressor are sealed with refrigerant in a dome (shell), the electrical entrance in the dome is a possible refrigerant leaking spot. In this system, there is no leak problem but the spark, fire and red hot winding caused by electric short circuit of the motor electric winding are major considerations concerns. Because the electrical winding short circuit can generate heat which can burn the motor and the these can get refrigerant burned to cause a major failure of the refrigeration (or a/c) system. This causes environment pollution (the destroyed refrigerant must be processed and dumped) and it is expensive to repair the motor. The mike 8001 induction motor design can solve this situation by repositioning the dome inside the motor (compare the position of the dome in FIG. 3 and FIG. 4) to leave the motor electric winding outside the dome. It is easier to cool down the winding by a fan or other means because it is not sealed inside a dome. To Seal a whole motor inside the traditional dome will limit the motor size, it will not be safe to put high power consumed electrical winding of the big motor with large capacity of flowing refrigerant in a completely sealed dome. The traditional hermetic system design will limit its capacity. The electrical wire entrance of the traditional dome of the hermetic (or semi hermetic) system gets the potential to cause leak. The open system will easily have the leak problem from the crankshaft entrance. Also a hermetic system is typically not built to handle a large capacity, because of the potential difficulties in sealing a high power motor winding with refrigerant in a dome (shell).

According to EPA rule, for industrial or commercial system contains more than 50 lb refrigerant, a substantial leak is defined as 35% loss of charge per year and must be repaired within 30 days after discovery. That is 17.5lb refrigerant leakage to the atmosphere to destroy ozone level (HCFC phase out by the year 2030) or to cause global warming problem. With the mike 8001, 8001-1 design applied to the compressor motor (FIG. 4) and to the valve control device (mentioned in the last paragraph of the section of DETAILED DESCRIPTION OF INVENTION, FIG. 8), there will be no chance to leak any refrigerant from the system.

BRIEF SUMMARY OF THE INVENTION

The ~~Mike 8001~~ induction motor design embodying features of the present invention will separate the compressor and refrigerant from the electrical winding to prevent refrigerant from getting burned by short circuit, overheat of the winding in the hermetic (or semi hermetic) system and there is no ~~leak possibility in the new design because the Mike 8001 design makes the new dome a completely sealed space (no electric wire entrance)~~ structure opening (electrical entrance) in the dome as a possible refrigerant leak spot. This design (~~Mike 8001 induction motor design~~) also can make bigger capacity hermetic (also semi hermetic) system than it is now by using bigger motor.

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~~If we can put~~ Putting the stator electrical winding along with its most part of each stator pole outside the dome, leave the rest small part of each stator pole and the whole rotor assembly inside the dome (or the end edge of the stator poles are in the same plane as the inside surface of the dome), ~~then we~~ can solve the stator electrical heating problem and also there is no leak problem. With this way, ~~we can use~~ a bigger motor can be used to make bigger capacity hermetic system, a capacity as open system is.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a hermetic ~~[[&]]~~ and/or semi hermetic refrigeration or air condition system.

FIG. 2 illustrates an open type system of refrigeration or air condition.

FIG. 3 illustrates an alternative view of FIG. 1.

FIG. 4 illustrates an ~~the Mike 8001~~ induction motor design embodying features of the present invention.

FIG. 4-1 illustrates an enlarged part of FIG. 4.

FIG. 4-2 illustrates an enlarged part of FIG. 4.

FIG. 4-3 illustrates an enlarged part of FIG. 4₁

FIG. 4-4 illustrates a cross section view of FIG. 4-3₁

FIG. 4-5 illustrates an embodiment of the ~~Mike 8001~~ induction motor design with stator electrical winding₁

FIG. 4-6 illustrates a cross section view of FIG. 4-5₁

FIG. 4-7 illustrates an embodiment of the ~~Mike 8001~~ induction motor design with the edge of the stator pole is in the same plane as the inside surface of the dome₁

FIG. 4-8 illustrates a cross section view of FIG. 4-7₁

~~FIG. 5 view of traditional motor stator~~

~~FIG. 5-1 Cross section view of FIG. 5~~

~~FIG. 5-2 view of traditional motor stator with its electrical winding~~

~~FIG. 5-3 cross section view of FIG. 5-2~~

~~FIG. 6 view of laminated structure of motor stator~~

FIG. ~~[[7]]~~ 5 illustrates an alternative embodiment of the present invention having a ~~Mike 8002~~ stator design, to show the dome, the cutting line, the stator and stator Pole pole₁

FIG. 7-1 5-1 illustrates a cross section view of FIG. ~~[[7]]~~ 5₁

FIG. 7-2 5-2 illustrates a stator pole part left with stator body after cutting₁

FIG. 7-3 5-3 illustrates a cross section view of FIG. 7-2 5-2₁

FIG. 7-4 5-4 illustrates an stator pole part left with dome after cutting₁

FIG. 7-5 5-5 illustrates a cross section view of FIG. 7-4 5-4₁

FIG. 8 ~~the 6~~ illustrates a gas valve with ~~like 8004~~ an embodiment of the induction motor design in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

As mentioned before, in both hermetic and semi hermetic system, the whole motor (including its stator electrical winding) are sealed in the same dome with the compressor (as shown in FIG. 1).

For clarity, ~~I reconstructed the FIG. 1 in the way as the FIG. 3 is an alternate view of the hermetic (or semi hermetic) system illustrated in FIG. 1, in which so the motor part is easily to be seen and separated from the compressor assembly farther away.~~ This system illustrated in FIG. 3 is different from the open system illustrated in FIG. 2 (open system). The system illustrated in FIG. 3 gets no opening to the outside (no motor shaft entrance from outside) has no motor shaft entrance from outside. Everything is still sealed in the dome; but just the direction of figure, the direction of compressor piston, the shape of dome has been is modified from FIG. 1 for clarity.

~~The ~~like 8004~~ As shown in FIG. 4, the induction motor design (FIG. 4) of a preferred embodiment of the invention~~ repositions the original dome inside the motor to put the stator electrical winding outside the dome (shown with heavy line) along with its most part of each stator pole, leave the rest small part of each stator pole and the whole rotor assembly inside the dome with the compressor. This stands in contrast to the design shown in FIG. 3. The nonmagnetic (or diamagnetic) material made dome is welded to stator poles to leave most part of each stator pole and its electrical winding outside the dome and seal a small part of each stator pole and the whole rotor assembly inside the dome with the compressor. The stator pole actually go through the dome (shell) to face the rotor directly. There is nothing between the stator pole and rotor. The distance between the stator pole and rotor is the same as that in the traditional motor. Motor efficiency will not be reduced. The part of the dome (or shell), that is surrounding the motor rotor assembly, should be nonmagnetic (or diamagnetic) material made, so the magnetic field generated by the electric winding in the motor will not be changed. The rest part of the dome (or shell) can be made with materials other than nonmagnetic (or diamagnetic) because the magnetic field in the motor will not be influenced by that part of the dome (or shell).

The enlarged part of FIG. 4 is shown in ~~FIG. FIGS.~~ 4-1 (dome shown with heavy line), 4-2, and 4-3. The cross section view of FIG. 4-3 is shown in FIG. 4-4.

The ~~the mike 8001 design with stator electrical winding of an embodiment of the invention~~ is shown on FIG. 4-5 and its cross section view is shown on FIG. 4-6.

The end edge of the stator poles can be in the same plane as the inside surface of the dome (~~like see~~ FIG. 4-7, ~~mike 8001-1 induction motor design, and~~ FIG. 4-8 which is the cross section view of FIG.4-7.) or the edge of stator pole can go further into the dome or shell (~~like see~~ FIG 4-3, ~~mike 8001 induction motor design, and~~ FIG. 4-4 which is the cross section view of FIG. 4-3). ~~In both designs (mike 8001 and mike 8001-1 design) the~~ The distance between the edge of stator pole and rotor will be the same as that in a traditional motor, motor efficiency will not be reduced.

~~The traditional induction motor stator structure is shown in FIG. 5 and its cross section view is shown in FIG. 5-1.~~

~~The traditional induction motor with its stator electrical winding is shown on FIG. 5-2 and its cross section is shown on FIG. 5-3.~~

The material of the part (which is inside the motor) of the dome, that is surrounding the motor rotor assembly, should be nonmagnetic (or diamagnetic) materials so the magnetic field generated by stator electrical winding will not be changed by the new position of the dome, or the motor may not work, this is indicated in FIG. 4-1. The thickness of the new dome shell, for the part that is welded to stator poles, should be minimum so stator poles can stay same depth as they was but other part of the dome (shell) can be thick. The stator poles also reinforce the dome (shell) where they are welded together. The mechanic strength of the dome for supporting motor and compressor should be strong enough.

Because the stator is a laminated structure ~~as in~~ FIG. 6 (to reduce the eddy current), the refrigerant can leak through between stator pieces. We also need welded stator pieces together (or any other way to seal those gaps between laminated stator pieces). The solder here we use to weld should be able to reduce the eddy current in the stator.

In order to make the new design motor repair job easier we can cut the stator poles in a way like FIG. ~~[[7]] 5~~ (as an alternative embodiment of the present invention) ~~like 8002 design~~. The dash line represents the cutting line. So the electrical winding and most part (not the whole part) of stator structure can be detached from motor easily. Also it can be replaced easily. When the stator with the electric winding has been detached from the shell, the shell still remains completely sealed condition because the end part of the stator poles have been welded with the dome. In this ~~like 8002 design~~ alternative embodiment, the efficiency of the motor is reduced due to the small air gap in the stator pole after the cutting. This design is only suitable for where the reliability is a major concern but not the motor efficiency.

The cross section view of FIG. ~~[[7]] 5~~ is shown on FIG. ~~7-4 5-1~~. The stator part, which can be detached from the dome, is shown on FIG. ~~7-2 5-2~~. The cross section view of FIG. ~~7-2 5-2~~ is shown in FIG. ~~7-3 5-3~~. After the cutting, the stator pole part left with the dome is shown on FIG. ~~7-4 5-4~~. The cross section view of FIG. ~~7-4 5-4~~ is shown on FIG. ~~7-5 5-5~~.

A ~~small like 8001 (& 8002)~~ motor design in accordance with the present invention can be used as an electronic controlled valve without leak problem because all moving part of the valve is welded sealed inside its dome. (FIG. ~~[[8]] 6~~, ~~dome shows shell shown~~ with heavy line). A metering device in an a/c or a refrigeration system can also be made with this design. The mechanic force to open and close the valve is generated inside the welded sealed space, not from outside. There is no structural opening as a possible leak ~~possibility~~ in this design.

While particular embodiments of the invention have been described above for purposes of illustration, the invention is not limited to these particular embodiments, and other embodiments will be apparent to those of ordinary skill in the art. Accordingly, it should be understood that the legal scope of the invention is defined by the words of the claims set forth in this patent.

INDUCTION MOTOR HAVING THE ROTOR LOCATED WITHIN A SHELL

ABSTRACT OF THE DISCLOSURE

The magnetic flux generated by stator electrical winding can flow inside motor stator structure, so ~~we really don't need to~~ it is unnecessary to put the stator electrical winding and the rotor in the same medium. ~~We can separate them~~ The stator and rotor can be separated by repositioning the dome (~~compare the position of dome in FIG. 3 to Fig. 4~~) of a hermetic (or semi hermetic) refrigeration (or air condition) system inside the motor. ~~Seal the~~ The rotor and compressor are sealed inside the dome and ~~leave the troublesome~~ stator electrical winding is outside of the dome or shell. ~~This way, the~~ The compressor powered by this ~~make 8001 (or 8001-4)~~ induction motor design can be much safer and more reliable to operate even in more critical environment (like pumping and compressing poison, dangerous gas). ~~There will be no possibility of leaking, no short circuit, no overheating problem and easy, cheap~~ It will also be easier to fix a motor with ~~make 8002~~ a detachable stator design.